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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 09/992,941 | 11/05/2001 | Ira Jeffery Bush | OPTI-0008 | 9187 |
| 24507 | 7590 | 01/29/2004 | EXAMINER | |
| MICHAEL BLAINE BROOKS, A PROFESSIONAL CORPORATION 5010 NO. PARKWAY CALABASAS SUITE 104 CALABASAS, CA 91302-3913 | | | TURNER, SAMUEL A | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2877 | |

DATE MAILED: 01/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|--------------------------------------|--|--|
| Office Action Summary | Application No. 09/992,941 | Applicant(s) BUSH, IRA JEFFERY | |
| | Examiner Samuel A. Turner | Art Unit 2877 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 October 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 6-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 6-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: |

DETAILED ACTION

Declaration Under 37 CFR § 1.131

The declaration filed 7 November 2003 under 37 CFR § 1.131 has been noted. However there seems to be some confusion with regard to the date of publication of the Bush et al(SPIE) article. The declaration lists the publication date as March of 2001 which would make the article available under 35 U.S.C. § 102(a) which can be overcome by 37 CFR § 1.131. The IDS-1449 lists the publication date as March 2000 which would make the article available under 35 U.S.C. § 102(b) which can not be overcome by 37 CFR § 1.131. Because of the confusing dates of publication a rejection under 35 U.S.C. § 102(b) has been made until the publication date can be resolved .

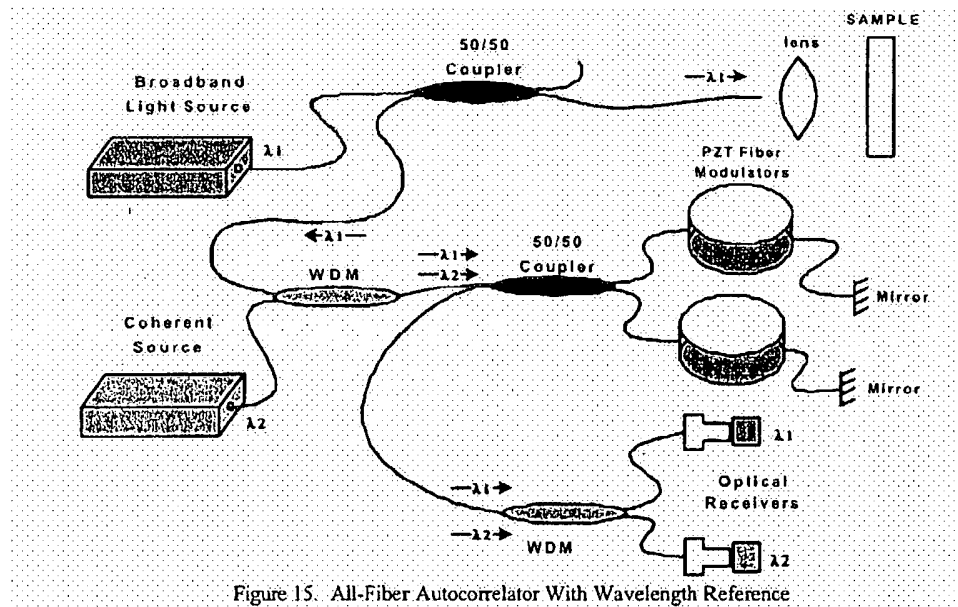
Claim Rejections Under 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1,2, and 6-20 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Bush et al(SPIE). Please note figure 15 and the common inventor Bush.



Claim Rejections Under 35 U.S.C. § 103

The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

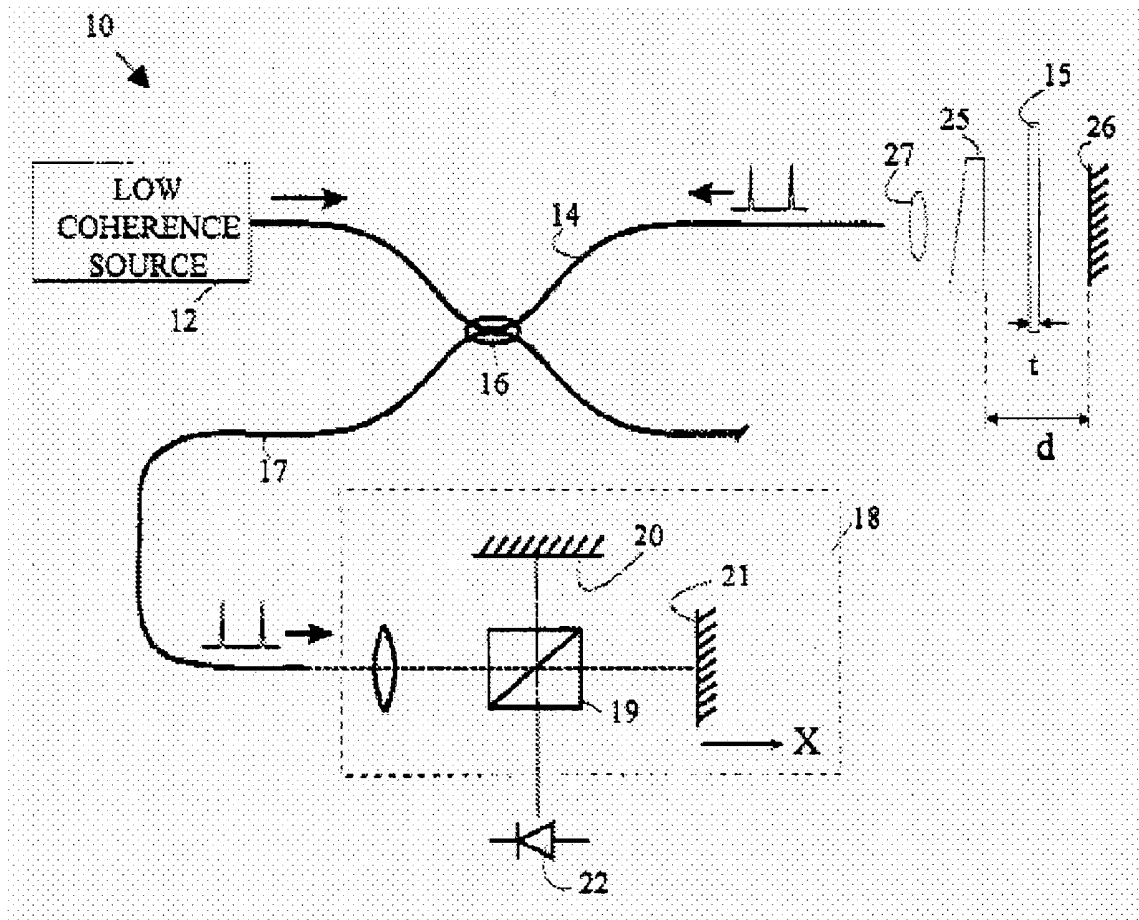
(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 10, 11, 15 and 16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Venkatesh et al(5,633,712) in view of Gelikonov et al(5,867,268).

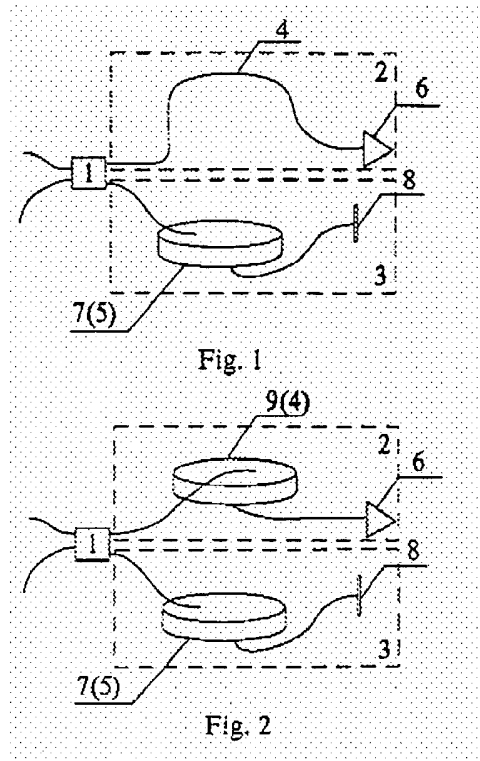
Venkatesh et al teach a fiber low coherence reflectometer autocorrelator comprising a low coherence source(12), fiber probe(14) with a focusing lens(27), and a bulk optical Michelson interferometer which acts as an autocorrelator. The

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autocorrelator includes a beam-splitter(19), reference mirror(20), scanning mirror(21), and detector(22). An all fiber autocorrelator is not shown by Venkatesh.



Gelikonov et al teach an all fiber low coherence interferometer comprising a low coherence source, first coupler(1), first fiber(4), probe(6), second fiber(5), reference mirror(8), and a detector. Piezoelectric modulator(7) is included to scan the optical path thus providing a practically inertialess path change. A second piezoelectric modulator(9) can be placed in the opposite arm of the interferometer connected in antiphase (a push/pull configuration) to further increase the total scan length.



It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the bulk optical autocorrelator Michelson interferometer of Venkatesh with an all fiber Michelson interferometer so that the scanning mirror would be replaced with the fiber piezoelectric modulator scanner which provides for a practically inertialess path change.

With regard to claim 16; it would have been obvious to one of ordinary skill in the art to use single-mode fiber in an all fiber autocorrelator in order to reduce noise. Official notice is taken that single-mode is used in fiber sensors to reduce the number of modes thus substantially reducing the noise due to mode competition effects. Note the cost of single-mode fiber. See In re Malcolm, 1942 C.D 589; 543 O.G. 440.

Claims 18, and 19 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Venkatesh et al(5,633,712) and Gelikonov et al(5,867,268) as applied to claims 10 , 11, 15, and 16 above, and further in view of Kempen et al(6,014,215).

Kempen et al teach a low coherence Michelson interferometer comprising a short coherence source(12), first fiber(22a), coupler(24), reference path(22b), scanning mirror(M_R), probe arm(22c), probe assembly(35), combined path(22d), and detector(16). Also included in the interferometer is long coherence source(112), coupler(122) for coupling the long coherence light to the Michelson interferometer, dispersive coupler(126) for separating out the long coherence light combined light path, and detector(116). The addition of the long coherence source and detector is to track the path change due to the scanning mirror.

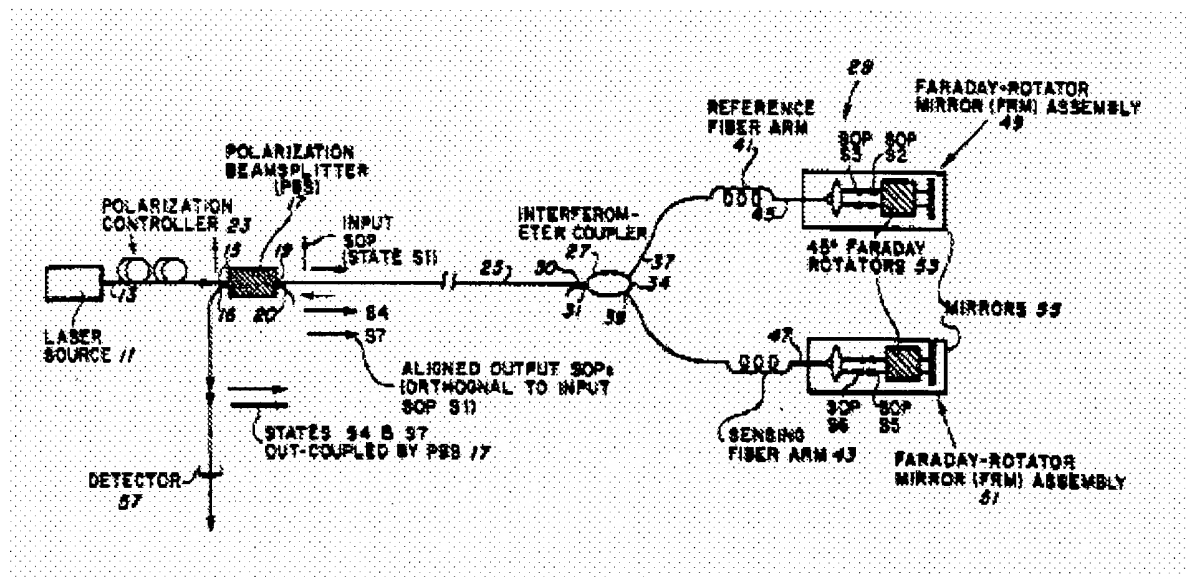


It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify an all fiber autocorrelator by including a separate long coherence source and detector in order to monitor the scanned path length, as taught in Kempen.

Claims 13, 14, and 17 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Venkatesh et al(5,633,712) and Gelikonov et al(5,867,268) as applied to claims 10 , 11, 15, and 16 above, and further in view of Kersey(5,206,924).

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Kersey teaches the use of Faraday rotator mirrors(49,51) in a fiber optical Michelson interferometer in order to provide for passive elimination of polarization fading.



It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the end mirrors in an all fiber autocorrelator arrangement with Faraday rotator mirrors in order to provide for passive elimination of polarization fading.

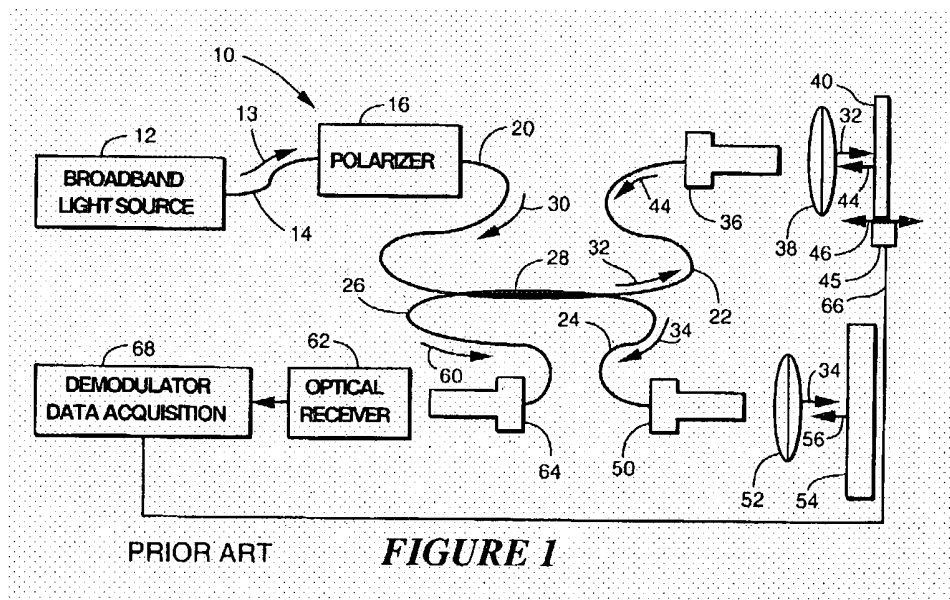
Claim 20 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Venkatesh et al(5,633,712), Gelikonov et al(5,867,268), and Kersey(5,206,924) as applied to claims 10 , 11, and 13-17 above, and further in view of Kempen et al(6,014,215).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify an all fiber autocorrelator by including a separate

long coherence source and detector in order to monitor the scanned path length, as taught in Kempen.

Claim 12 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Venkatesh et al(5,633,712) and Gelikonov et al(5,867,268) as applied to claims 10 , 11, 15, and 16 above, and further in view of the prior art of applicant's figure 1.

Applicant's prior art figure 1 teaches a Michelson fiber interferometer which includes an input polarizer and polarization maintaining fiber to limit the polarization a single polarization mode thus eliminating polarization fading.



It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a polarizer in an all fiber autocorrelator and to use polarization maintaining fiber in the all fiber autocorrelator in order to eliminate polarization fading.

Claims 1 and 2 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Venkatesh et al(5,633,712) in view of Gelikonov et al(5,867,268) and Kersey(5,206,924).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the bulk optical autocorrelator Michelson interferometer of Venkatesh with an all fiber Michelson interferometer so that the scanning mirror would be replaced with the fiber piezoelectric modulator scanner which provides for a practically inertialess path change and to replace the end mirrors in an all fiber autocorrelator arrangement with Faraday rotator mirrors in order to provide for passive elimination of polarization fading. Further, it would have been obvious to use single-mode fiber in an all fiber autocorrelator in order to reduce noise. Official notice is taken that single-mode is used in fiber sensors to reduce the number of modes thus substantially reducing the noise due to mode competition effects. Note the cost of single-mode fiber. See In re Malcolm, 1942 C.D 589; 543 O.G. 440.

Claims 6-9 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Venkatesh et al(5,633,712), Gelikonov et al(5,867,268), and Kersey(5,206,924) as applied to claims 1, and 2 above, and further in view of Kempen et al(6,014,215).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify an all fiber autocorrelator by including a separate

long coherence source and detector in order to monitor the scanned path length, as taught in Kempen.

Response to Arguments

Applicant's arguments filed 27 October 2003 have been fully considered but they are not persuasive.

With regard to applicant's arguments with respect to Gelikonov; applicant points to page 2, lines 60+ and states that Gelikonov teaches away from the fiber PZT modulator. This however is a discussion of the prior art, specifically EPO-0,356,056. Gelikonov clearly teaches fiber PZT modulators in the optical paths, therefor the rejection meets the requirements of 35 U.S.C. § 103(a).

With regard to applicant's arguments with respect to Kersey; applicant argues that Kersey uses the Faraday-rotator mirrors for polarization fading in a coherent system while applicant is concerned with coherence broadening. Both coherence broadening and polarization fading are caused by the same problem of birefringence in long optical fibers. As the use of a Faraday-rotator mirror is the solution to polarization fading due to the effects of fiber birefringence, the skilled artisan would have been motivated to solve the similar problem of coherence broadening by using a Faraday-rotator mirror.

With regard to applicant's arguments with respect to Kempen; applicant argues that because Kempen uses a reflector(130) while applicant's coherent and incoherent light paths take exactly the same path the inventions are significantly

different. Both the claimed invention and Kempen use a coherent source to monitor the path length change due to the movement of the scan mirror. Kempen uses the reflector(130) so that the long coherent light is not changed by the sensor(35). So long as the the arms of the interferometer are within the coherence length of the specific source the light will interfere. Therefor the skilled artisan would have been motivated to apply the teachings of Kempen to monitoring the scanning mirror while only using the reflector(130) if a sensor would interfere with the coherent light. Further, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory

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period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samuel A. Turner whose phone number is **571-272-2432**.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font, can be reached on **571-272-2415**. The fax phone number for the organization where this application or proceeding is assigned is **703-872-9306**.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is **571-272-1562**.

Any other inquiry of a technical nature, and all inquiries of a general nature including those relating to the status of this application or any patent term adjustment should be directed to TC2800 Customer Service Office whose telephone number is **571-272-1585**.



Samuel A. Turner
Primary Examiner
Art Unit 2877